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BUREAU OF ANIMAL INDUSTRY.—BULLETIN 131.

A. D. MELVIN, CHIEF OF BUREAU.

BEEF PRODUCTION IN ALABAMA.

I. COST OF RAISING THE CATTLE.
II. WINTERING STEERS PREPARATORY TO SUMMER FATTENING ON PASTURE.
III. FATTENING CATTLE ON PASTURE.

BY

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LETTER OF TRANSMITTAL.

United States Department of Agriculture,
Bureau of Animal Industry,
Washington, D. C., October 29, 1910.

Sir: I have the honor to transmit for publication as a bulletin of this Bureau the accompanying manuscript on the subject of Beef Production in Alabama, by Prof. Dan T. Gray, of the Alabama Agricultural Experiment Station, and Mr. W. F. Ward, junior animal husbandman in this Bureau.

The work described in this paper is the result of several years' cooperative experiments between this Bureau and the Alabama Experiment Station, the main object of which was to test the possibilities of that section, and of the South generally, in regard to beef production from native stock. It can be seen from the accompanying pictures of the cattle used in these experiments that there is much room for improvement in the matter of grading up the stock for the purpose mentioned. Nevertheless the use of certain southern feeds combined with pasture proved to be highly successful with these animals, and although the work is still in progress enough has been accomplished to warrant the publication of the results to date.

The outcome of the summer feeding experiments, given in Part III of the paper, would indicate that beef animals can be very profitably prepared for market in the South. The natural advantages for cattle raising which the Southern States undoubtedly possess, especially in the tick-free portions, seem to present a powerful argument both for the eradication of the tick and for the rapid extension of the beef-cattle industry by our southern farmers. These considerations acquire additional force at the present time because of the long-continued scarcity and high prices of beef, not only in this country but abroad.

Respectfully,

A. D. Melvin,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTORY NOTE.

The results presented in this bulletin are those of experiments continuing the investigations in beef production begun in cooperation with the Alabama Experiment Station in 1904 under the provisions of the special appropriation by Congress for investigations in animal feeding and breeding, the results of which were published as Bulletin 103 of this Bureau. The first investigation was a study of the economy of applying northern feeding systems to southern conditions. Southern feeds were used, but the cattle were kept in yards and the value of the manure was not considered. The work was carried on during three successive winters, and the results did not show sufficient profit from the methods used to warrant their continuation or extension.

The plans of the work were then changed along the lines presented in this publication, and although it is still being carried on and will be continued, sufficiently definite data have been obtained to justify publication.

Professor Gray and Mr. Ward present four good and valid reasons for raising beef cattle in Alabama, which are especially pertinent to Alabama farmers. There is a fifth reason for the extension of the beef-cattle industry, not only in Alabama but in the other Southern States, which directly concerns the country at large, namely, the absolute necessity for the country to increase its supply of beef. No more striking fact is shown by the statistics of the industry during recent years than the decrease in the supply of beef in the United States. Beef cattle appear to be decreasing in actual numbers, and much of the land formerly devoted to beef raising and fattening is being used for other purposes. As a consequence beef is high and is going higher, the amount of beef exported is falling off, and, unless some relief appears, beef will eventually become a luxury.

There are two ways of increasing the beef supply—by raising more beef in the United States or by importing it. The idea of relieving the situation by importing beef is repugnant to many, and an extension of the home industry must be found if possible. The results presented in this bulletin show that the South offers the solution. For instance, with only 40 per cent of the land of Alabama occupied, the authors show that the land is there to be used. With the tickextermination work progressing so satisfactorily, the only serious obstacle to the industry in the South is being removed.[a]

To the close of the fiscal year 1910 an area of 129,611 square miles had been freed from ticks, and the Department is confident that complete eradication of this pest is only a matter of time. Each county placed above the quarantine line changes a territory where beef production has been a restricted industry to one of the fullest freedom of operation. To work out the economy of beef raising in this territory is one of the most pressing animal husbandry problems of the day.

GEO. M. ROMMEL,
Chief of Animal Husbandry Division.

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[a] It should be understood that all the cattle used in these cooperative experiments were raised and fed in quarantined territory. All were on tick-infested pastures, but excessive infestation by the cattle was prevented by greasing and dipping. The cattle therefore did not suffer the usual drain from the presence of enormous numbers of ticks. However, like all immune cattle, the protozoan which causes Texas fever was present in the blood of these cattle in probably undiminished numbers. These organisms naturally cause a serious but immeasurable drain, and there is probably no means to free cattle from them. The only known way to rid a herd of the protozoa in the blood of the cattle is to raise calves from tick-free cows and bulls on tick-free pastures. Such calves will be free from both tick and protozoa, and will, of course, be susceptible to Texas fever.

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CONTENTS.

I. COST OF RAISING THE CATTLE.

Page.
Introduction.......... 9
Details of the experiments.......... 11
    Object of the work.......... 11
    Cattle used.......... 12
    Management of the herd.......... 12
    Method of collecting data.......... 13
    Prices of feeds.......... 13
    Weights and gains.......... 14
    Cost of gains.......... 15
    Cost of wintering the cattle.......... 16
    Area of pasture required for each animal.......... 17
    Breeding record.......... 18
Financial statements.......... 19
    Feed expense to get a beef animal to various ages.......... 19
        Extra charges and credits.......... 20

II. WINTERING STEERS PREPARATORY TO SUMMER FATTENING ON PASTURE.

Details of the experiment.......... 25
    Plan of the work.......... 25
    Cattle used.......... 26
    The winter range.......... 26
    Method of feeding and handling the cattle.......... 26
    Character and price of feeds used.......... 27
Wintering the cattle.......... 28
    Results of the winter feeding.......... 29
    Amount of winter feeds used.......... 30
    Gains and losses of steers by months.......... 32
    Financial statement for winter work.......... 33
Summary of winter work.......... 35

III. FATTENING CATTLE ON PASTURE.

Introduction.......... 37
The summer pasture.......... 37
Details of the summer feeding.......... 38
    Feeds consumed.......... 38
    Gains made.......... 40
    Cost of gains.......... 41
Financial results of summer feeding.......... 42
Slaughter results.......... 45
Summary of summer work.......... 46

ILLUSTRATIONS.

Page.

Plate I. Steers at beginning of summer feeding period, 1908, lot 3, wintered on range and half ration of cowpea hay.......... 12

II. Steers at beginning of summer feeding period, 1909, portion of lot 1, wintered on range alone.......... 12

BEEF PRODUCTION IN ALABAMA.

I. COST OF RAISING THE CATTLE.

INTRODUCTION.

The work of eradicating the Texas-fever tick is progressing satisfactorily in the South. Every year new areas are freed from the tick, and with the progress of the work there comes an added interest in all kinds of cattle production. When the ticks in a county are exterminated, interest begins to be immediately manifested in the beef-cattle business, as the southern farmers now realize that the Texas-fever tick has been practically the only drawback to the cattle business in the past. When the tick is finally exterminated, no section of the United States will be so well suited to beef production as the South, because of its mild climate, long grazing season, and cheap land.

At the present time the South produces but a small proportion of the meat that her people consume. In Alabama there are but 528,000 head of cattle other than milk animals,[a] or, in other words, there are about 1.2 head of cattle in the State to each family. If no outside meats were shipped into the State, this supply would be quite inadequate for the needs of the people. There is, therefore, a wide field open to the southern farmer who wishes to produce beef.

There are many reasons why the Southern States should raise more beef cattle than are being raised at the present time. First, the South, under the present system of farming, has thousands of acres of land, and good land, too, which are not being used at all. Statistics tell us that only about 40 per cent of the tillable or arable land of the South is being used. Sixty per cent of the land is lying idle and returns to the owner not a cent in wealth. All of the lands can not be used as cotton lands, because, first, there are not enough people to work the lands in any such way, and, second, many of these pauper acres are not suitable for cultivation. In fact, many acres that are now under cotton cultivation should be turned into permanent pastures and grazed with live stock. No State can become wealthy when only 40 per cent of the land capital is being used. The grocer, or the banker, or the hardware merchant could not possibly make a profit on his business if he used only 40 per cent of his capital, and the farmer can not hope to be successful in his operations until he begins to make use of at least a reasonable proportion of his capital.

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[a] Crop Reporter, February, 1910, United States Department of Agriculture.

Then, again, beef cattle should be more generally introduced, because of the good they do in building up and maintaining soils. Under the present system of cotton farming the soils are becoming poorer and poorer. With the introduction of cattle the soil will begin to improve. Director Thorne, of the Ohio Station, has been making tests with barnyard manure for several years, applying the manure upon a plat of ground upon which was running a three years' rotation of corn, wheat, and clover. Eight tons of manure an acre were applied. The average yearly increase on each acre, following the one application, was as follows:

Corn, 14.7 bushels, at 70 cents a bushel	$10. 29
Corn stover, 744 pounds, at $6 a ton	2. 23
Wheat, 8.36 bushels, at $1 a bushel	8. 36
Wheat straw, 897 pounds, at $4 a ton	1. 79
Clover hay, 686 pounds, at $12 a ton	4. 12
Total value, 8 tons of manure	26. 79
Total value, 1 ton of manure	3. 35

He further states[a] that the value of farm manure can be materially increased by balancing the manure with the addition of a carrier of phosphorus. The farm manures are too high in nitrogen as compared with the other elements. By balancing the stable manure the value of 8 tons was increased $12.20 after deducting the cost of the material used for the balancing of the manure. This is $1.53 a ton, and, when added to the $3.35 above, brings the total possible value of each ton of manure up to $4.88. During a feeding period of one hundred days each steer will produce at least 1½ tons of manure, and this profit should be added to the direct profits of feeding.

The Arkansas Station (Bulletin 68) made a test to determine the value, to each succeeding crop, of growing peas in the corn, gathering the corn, and then grazing both the peas and the stalks by the steers. The steers were being fed some cotton seed in addition to the grazing. As the result of this crop of peas and the grazing the succeeding cotton crop was increased 626.5 pounds of seed cotton per acre over the area where corn alone had been grown. A third lot was planted to corn, and the increase in corn, due to the pea crop and the grazing, was 14 bushels an acre.

A third reason why beef should be more generally produced in the South is that there is a demand for it, and the demand should be met in order that the money may be kept at home. It has been stated in a previous publication[a] that during the year 1907 there were about 15,151 home-raised animals slaughtered in the city of Birmingham (this included cattle, veal, hogs, sheep, and kids), while there were 36,097 live western animals brought into the city and slaughtered. In addition to all this, thousands of pounds of cured meats were also retailed over the city. This money should all be kept at home and added to the southern wealth. Packing houses are now being built throughout the South, and good markets are assured for the beef animals which the farmer produces.

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[a] Bulletin 183, Ohio Experiment Station.

The fourth reason offered in favor of beef production is the opportunity that it offers for the profitable utilization of "roughage." As the farmers learn the value of diversification in farming operations, there will be an increased amount of roughage, such as corn fodder, cowpea and clover hays, and soy beans, which many times can be marketed more profitably through the beef animals than in any other way. The beef cattle serve as important machines for converting the surplus fodders into valuable barnyard manure, which gives to the growing crops not only the benefits of its fertilizing elements, but enhances the natural condition of the soil by the addition of that important compound—humus. No animal can take the place of the beef steer in making use of the winter corn and cotton fields.

Finally, it may be said that beef cattle are peculiarly suited to fit into the farming operations of the South. The farms are large, and many acres are not being used because of the lack of sufficient labor. At present there is no better way to put the whole farm to work than by introducing beef cattle into the system of farming. They require but a small amount of labor in addition to that used upon the average cotton farm. The hog, while he deserves a prominent place upon almost every farm, can not be made to use all of the large uncultivated areas on the farms, as he is not strictly a grazing animal. Many farmers who have large uncultivated areas are not now sufficiently skilled in the handling of live stock to introduce sheep or dairy cattle, as these branches require more skill in stock management than the beef business. Then, too, the dairy business requires an increase in the amount of labor used upon the farm; and the labor item is one that many farmers are trying to reduce.

DETAILS OF THE EXPERIMENTS.

OBJECT OF THE WORK.

In order to obtain definite information regarding beef production in the South, which would make it possible to outline work for the future, this Bureau and the Alabama Experiment Station undertook a cooperative experiment with a large stock farmer in the Tennessee Valley.

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[a] Farmers' Bulletin 411, United States Department of Agriculture.

The primary object of this work was to learn what it would cost to raise a grade steer to the feed-lot period, under average southern conditions. After this was determined, it was expected that suggestions could be made and plans offered by which beef animals could, in the future, be produced more cheaply than were the ones in this test.

CATTLE USED.

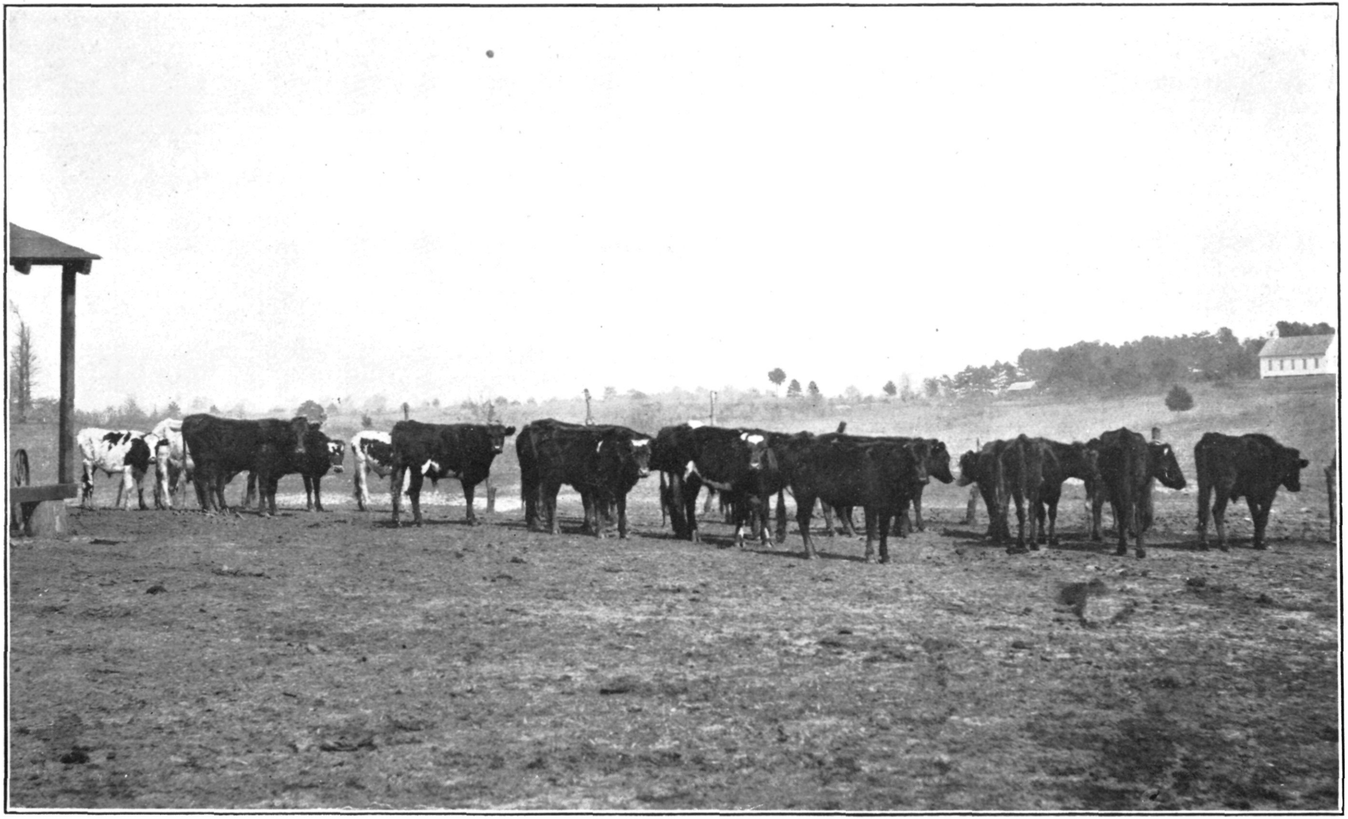
The animals used in the work were a herd of grade Aberdeen-Angus cows, headed by two purebred Aberdeen-Angus bulls. The owner of the herd, with whom the work was conducted, began in 1900 the work of grading up some Holstein and scrub cows by the use of purebred Aberdeen-Angus bulls. The Holstein cows had been used for dairy purposes, and the scrub cows were bought from some of the neighboring farmers. The scrub and Holstein mothers were not included in the experimental work, their grade offspring being used. The experimental herd, at the beginning of the test, in 1906, consisted of the following animals:

Cows (that had dropped calves)	15
Two-year-old heifers (18 to 30 months)	13
Yearling heifers (12 to 18 months)	12
Heifer calves (recently born)	14

Three of the above cows were 5 years old; the others were less than 5 years of age. All of them were grade Angus. Some of the young ones were three-fourths pure, but the majority were but one-half pure. While there were some purebred Aberdeen-Angus cows upon the farm, they were not included in the test. No purebred animals were used but the bulls.

MANAGEMENT OF THE HERD.

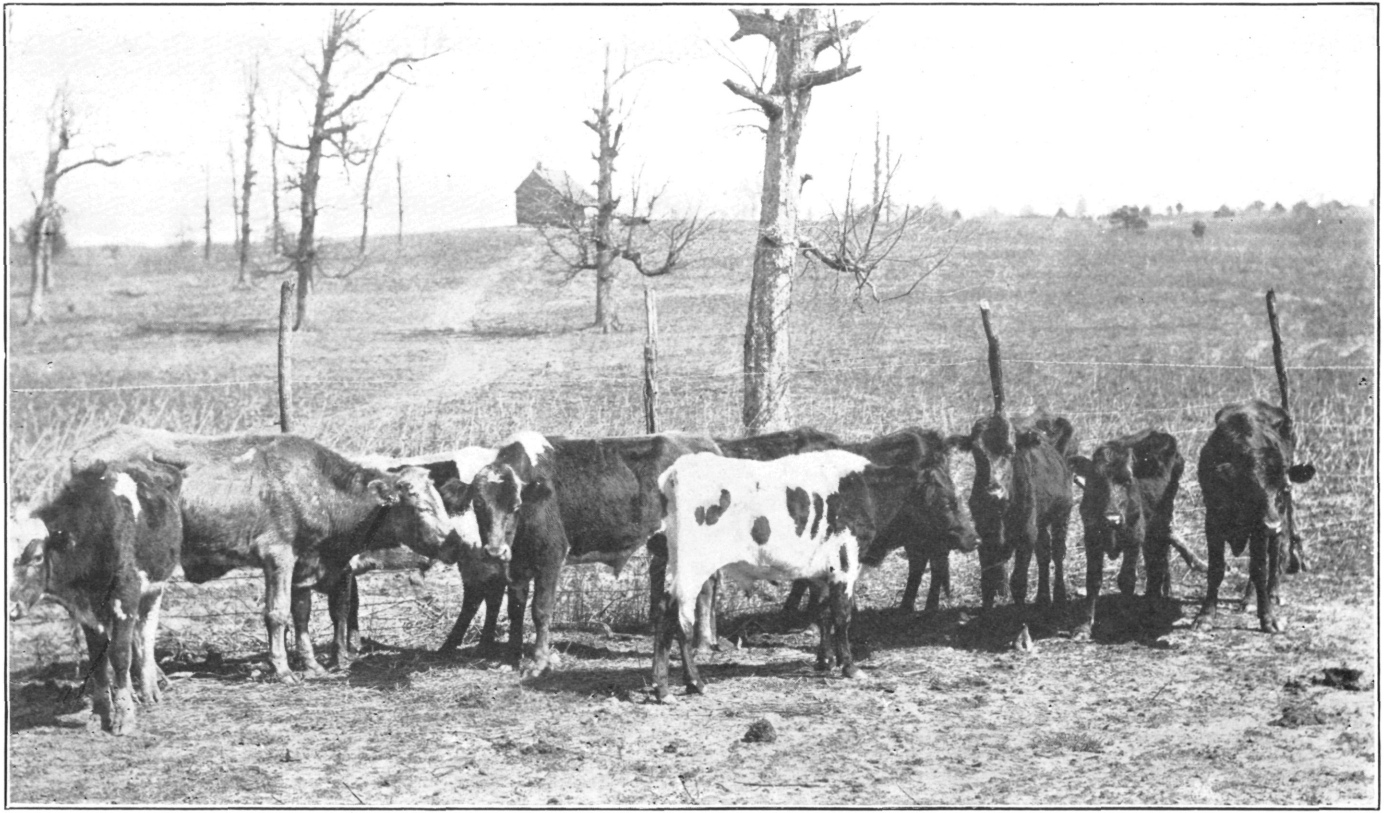
During the summer months the herd grazed upon a good pasture; no feed was given in addition to the pasture. This pasture was made up principally of white clover, Bermuda, and Japan clover (Lespedeza). This afforded the animals abundant pasture for about seven months of the year. During the winter months all of the cattle, young and old, had the run of the range. This range, which was inclosed, consisted of the old corn and cotton fields, with some cane along the river and creek banks. In addition to the winter range, hay and cotton seed were fed (see statement later for the winter feeds), so when spring came the cattle were in reasonably good flesh. It might have been profitable to have kept all the animals gaining throughout the winter months; as to this the authors can not say, since this test does not cover that point. The young stock did make gains during each winter, but the cows and older animals usually lost in weight during the latter part of the winter.



Steers at Beginning of Summer Feeding Period, 1908.

Lot 3, wintered on range and half ration of cowpea hay

Plate II.



Steers at Beginning of Summer Feeding Period, 1909.

The shelter was of such a nature that none of the animals suffered from the cold. During the mild winter weather the cane-brake afforded ample protection from the cold, and in severe storms or continued wet spells the cattle barn was used.

During the first year of the test the bulls were not allowed to run with the cows. They were kept in a pasture separate from the cows, and the cows brought there to be bred. It was learned, however, that many of the cows went through the year without bringing calves, as the other farm work prevented the owner from keeping in close touch with them. During the second year's work the bulls were allowed to run with the cows; thereupon the percentage of calves born during the first quarter of the year increased very materially, as compared with the previous year.

As previously mentioned, no effort was made to eradicate the ticks completely. When the cattle became badly infested they were greased on those parts of the body where the ticks were most numerous.

METHOD OF COLLECTING DATA.

The farm was visited at least once every three months by a bureau or station representative, and data secured about the births, deaths, weights, feeds used, and other items. Each animal was numbered by means of a metal tag in the ear, so that individual records could be secured. Soon after a calf was born it was tagged and weighed. All feeds were weighed or measured out to the animals. Large amounts of manure were produced but no account was kept of it, as most of it was dropped out in the fields and pastures. During the winter months some manure was collected around the barns and lots; this was all hauled onto the cultivated fields.

PRICES OF FEEDS.

Local conditions determined to a large extent the price of feeds. Any prices that the authors might assume would not meet all conditions, but the following have been used as a basis for the financial estimates:

Mixed hay	per ton	$6.00
Cotton seed	do	14.00
Green sorghum	do	1.50
Pasture for the season	per acre	2.50

The hay, which consisted of a mixture of sorghum, crab grass, Johnson grass, and cowpeas was not of good quality, so a rather low farm price was placed upon it. Six dollars a ton was all it was worth. The green sorghum was used one fall (1906) for several days to supplement a pasture which was rendered short on account of an extreme drought and an early frost. The sorghum was cut and immediately thrown to the cattle. No price was placed upon the winter range. One hundred sheep, and about 30 horses and mules used the winter range in common with the cattle.

WEIGHTS AND GAINS.

TABLE 1.—*Average weights and gains of the cattle.*

Class.	Number of animals.	Average final weight.	Summer gains.		Winter gains.		Summer and winter gains.	
			Average gain per head for summer.	Average daily gain.	Average gain (+) or loss (−) per head for winter.	Average daily gain (+) or loss (−).	Total gain per head.	Daily gain per head.
		Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
1 to 12 months	44	402	224	1.24	+ 52	+0.29	276	0.77
12 to 24 months	42	645	219	1.22	− 16	− .09	203	.56
24 to 30 months	30	773	196	1.09	− 25	− .14	170	.47
24 to 33 months	18	832	170	.95	− 35	− .19	136	.40
Cows[a]	....	....	116	.65	−104	− .58	12	.03

[a] The number of cows is not stated because the number varied from time to time.

From the above table it is seen that at 12 months of age the calves averaged 402 pounds in weight, while the 24-months-old steers averaged 645 pounds, the 30-months-old steers averaged 773 pounds, and the animals which were 33 months old weighed 832 pounds. These are light weights, which were due, in part at least, to the fact that the animals had ticks on them during the summer months.

During the summer the gains were heaviest with the calves, as they made a gain of 224 pounds from April 15 to October 15, or a daily gain of 1.24 pounds. The yearlings made a gain of 219 pounds, or a daily gain of 1.22 pounds during the summer six months. During the third period (24 to 30 months) a daily gain of 1.08 pounds was made, while in the fourth period (24 to 33 months) a daily gain of only 0.95 of a pound per head was made. The cows gained 0.65 of a pound per head per day, or a total gain of 116 pounds each during the summer.

During the winter months (October 16 to April 14) each calf made a total gain of 52 pounds, or a daily gain of 0.29 of a pound per head. The yearlings lost 16 pounds each in weight for the winter, the animals ranging from 24 to 30 months old lost 25 pounds each, and those which came in the fourth class (24 to 33 months) lost 35 pounds each for the same period. The cows lost 104 pounds each, which was largely due to the fact that many of them dropped calves during the winter time.

An average of the whole year shows that the calves made a daily gain of 0.77 of a pound, or a total gain of 276 pounds per head. The yearlings made a daily gain of 0.564 of a pound per head, or a total of 203 pounds for the 12 months. A gain of 170 pounds per head, or a daily gain of 0.47 of a pound, was made by the cattle while they were increasing from 24 to 30 months in age, while 136 pounds, or 0.4 of a pound per head per day, was made by the animals while they were increasing in age from 24 to 33 months. The cows gained only 12 pounds for the year, showing that they were practically mature when they first dropped calves.

In short, the table shows that under the conditions of this experiment the daily gains were smaller as the animals increased in age. This was true in both the summer and the winter work.

The gains were not as large as they should have been, due partly to the extremely dry weather from June to July 20, 1906, when the grass in the pastures became perfectly dry, and partly to the fact that one of the pastures used in 1907 was so wet in the early spring that the grass did not grow satisfactorily during the whole summer. The fact has already been mentioned that the animals were also infested with the cattle tick.

COST OF GAINS.

The cost of gains during the summer was based upon a rental of $2.50 per acre for all land used for pasture; calves under 1 year of age were charged one-half price. When the cost of keeping the dam was not charged against the calves, they made 100 pounds of gain at a cost of 63 cents, but when the expense of pasturing both dam and calf was charged against the calf, the cost of 100 pounds of gain was raised to $1.88. The cost of keeping the dam represents the expense of keeping 1.39 cows, as only 1 calf was produced to every 1.39 cows (see Table 4). The yearlings made 100 pounds of gain during the summer at a cost of $1.28, the 2½-year-old steers (24 to 30 months) at a cost of $1.43, and the gains of the steers in the fourth class (24 to 33 months) were made at a cost of $1.65 per 100 pounds.

In the winter all cattle had access to the corn, cotton, and pea-stubble fields of the plantation and were fed some hay and a small amount of cotton seed to keep them in a fair condition of flesh. The average cost of wintering those animals that were more than 12 months of age was $4.90 per head (see Table 2).

When the cost of wintering the dam was charged against the calf, the cost of 100 pounds of gain was $9.42. As all the other animals lost some in weight during this period, the cost of gain could not be determined.

The last column of Table 2 shows that when the cost of keeping the dam was not charged against the calf, 100 pounds of gain for the whole year cost 51 cents, but when the dam's yearly expense, as well as the pasture of the calf, was charged against the calf, the total cost to make 100 pounds of gain was $3.30. The cost of keeping an animal from the time he was 12 months until he was 24 months old was $7.70; the amount of gain was 203 pounds, thus making 100 pounds of gain cost $3.79.

The 2-year-old animals (24 to 30 months) gained 170 pounds at a a cost of $7.70, or at a rate of $4.53 per 100 pounds for the year. The cost of gain on the long 2-year-old cattle (24 to 33 months) was $5.66 per 100 pounds. The last column of the table points out the fact that, as the animal advanced from the calf period to maturity, the cost of 100 pounds of gain increased, and, all other conditions being equal, the younger the animal the cheaper were the gains.

The results shown in Table 2 are based upon the charges for feed as shown on page 13.

TABLE 2.—*Average cost of summer, winter, and annual gains.*

Class.	Summer.			Winter.			Whole year.		
	Pounds gain.	Cost of pasture.	Cost of 100 pounds gain.	Pounds gain (+) or loss (−).	Cost of feed.	Cost of 100 pounds gain.	Pounds gain.	Cost of pasture and feed.	Cost of 100 pounds gain.
Calves,[a] 1 to 12 months...	224	$1.40	$0.625	+ 52	....	....	276	$1.40	$0.51
Calves,[b] 1 to 12 months...	224	4.20	1.88	+ 52	$4.90	$9.42	276	9.10	3.30
Yearlings, 12 to 24 months.	219	2.80	1.28	− 16	4.90	....	203	7.70	3.79
2-year-olds, 24 to 30 months..................	195	2.80	1.43	− 25	4.90	....	170	7.70	4.53
2-year-olds, 24 to 33 months..................	170	2.80	1.65	− 35	4.90	....	136	7.70	5.66
Cows, all ages............	116	2.80	2.41	−104	4.90	....	12	7.70	64.18

[a] Keep of dam not charged.

[b] Keep of dam charged.

COST OF WINTERING THE CATTLE.

Table 3 shows the total amounts of feed consumed, the total cost to winter the whole herd, and the average cost per winter for three consecutive winters. Only animals above 1 year old are counted. The feed that the calves ate is charged against those animals which were more than 1 year old.

TABLE 3.—*Cost of wintering cattle.*

Year.	Number of cattle.	Pounds of cotton seed consumed.	Cost of cotton seed.	Pounds of green sorghum consumed.	Cost of sorghum.	Pounds of hay consumed.	Cost of hay.	Total cost.	Average cost per head.
1905–6..............	45	27,000	$189.00	....	....	35,600	$106.80	$295.80	$6.57
1906–7..............	65	12,000	84.00	22,000	$16.50	39,600	118.80	219.30	3.37
1907–8..............	59	3,132	21.92	....	....	86,443	259.32	281.24	4.77
Average..............	....	14,044	98.31	7,333	5.50	53,881	161.64	265.45	4.90

During the winter of 1905–6 the herd consumed 27,000 pounds of cotton seed and 35,600 pounds of hay. That is, each animal that was more than 12 months old consumed 600 pounds of cotton seed and 791 pounds of hay for the whole winter. The winter of 1905–6 was a hard one on the cattle, as it was very wet and rainy, and the winter range was not as good as usual, hence the large amount of feed consumed.

With cotton seed charged at $14 a ton and hay at $6 a ton, each animal that was over 12 months old consumed $6.57 worth of feed. The cattle, as a herd, came through the winter in good condition.

The winter of 1906–7 was very mild and the cattle did not eat as much feed per head as they did the previous winter. There were two very heavy frosts on the nights of October 13 and 14, however, which killed all the Japan clover (Lespedeza), so the cattle had to be fed some green sorghum from the middle of October until the fields became available as winter range. Each animal consumed, during the whole winter, 338 pounds of green sorghum, 185 pounds of cotton seed, and 610 pounds of hay. The cost of wintering each animal over 12 months old was $3.37.

From October 16 to December 1 of the winter 1907–8 the cattle were fed hay and a small amount of cotton seed, as there was no green sorghum to be used. During this time they consumed 11 pounds of hay and 1.2 pounds of cotton seed per head per day. From December 1 to January 1 they were in the fields and canebrake and did not come up for feed. From January 1 to March 20, 1908, the cattle came up to the barn each evening and were fed hay, but no grain. For the whole winter each animal consumed 53 pounds of cotton seed and 1,465 pounds of hay. The cost of wintering was $4.77 per head.

The average for the three winters shows that it cost $4.90 to winter each animal over 12 months of age.

AREA OF PASTURE REQUIRED FOR EACH ANIMAL.

A number of cattle not in the experiment were grazed in the pasture with the experimental cattle. Assuming that two calves would eat as much grass as an animal over 12 months old (and this assumption is followed out in rental charges), there would be the equivalent of 92 animals on 103 acres of land during the summer of 1906, or an average of 1.12 acres of pasture to each animal. During the year 1907 there were 90 animals on the 103 acres, giving an average of 1.14 acres to each animal. An average for the two years shows that 1.13 acres of land furnished pasture for one animal. This area, when charged at $2.50 per acre, gives a cost of $2.80 per season for the pasture of each animal over 12 months old.

This pasture was far better than the ordinary Alabama pasture, as is shown by the fact that 1.13 acres supplied sufficient pasture for one animal. On the average, from 3½ to 5½ acres are required for each animal. When this piece of land was first put down to pasture it would not keep as many animals as it does now; in fact it was no better than the average pasture, but by grazing it has been raised to its present state of fertility.

BREEDING RECORD.

TABLE 4.—*The percentage of calves born.*

Year.	Number of cows.	Calves dropped.		Record by quarters; number of calves dropped.			
		Number.	*Per cent.*	January 15 to April 14.	April 15 to July 14.	July 15 to October 14.	October 15 to January 14.
1906	24	17	70.8	5	4	5	3
1907	25	18	72	9	1	5	3
1908	25	[a] 14	....	14	....	....	....

[a] The experiment closed on April 14, 1908, so no record was obtained later than this date.

An animal that had dropped a calf was classified as a cow; the heifers were put in this class as soon as they calved. The number of calves born in 1906 and 1907 was very small compared to the number of cows that should have brought calves. This low number was partly due, no doubt, to the fact that the bulls were kept away from the cows, and the owner, owing to the pressure of other business, was not able to breed the cows when they should have been bred. The owner soon realized the fact that too many of the cows went through the year without bringing calves, so in the spring of 1907 he turned the bulls with the cows and permitted them to run together the entire year.

A complete record of the number of calves dropped was not secured for the year 1908—the year after the bulls were turned with the cows—as the test closed in April; but during the first quarter 14 calves were born, while during the same quarter of the years 1906 and 1907 only 5 and 9 calves, respectively, were born. No record was kept of the number of calves dropped after April, 1908, but when the last notes and weights were made it was seen that practically all of the cows were pregnant. It is, of course, a disputed point whether it is better to allow the bull to be with the cows or to keep him away from them all of the time. The farmer who has large pastures and much other business to look after, in addition to the cattle, can not possibly obtain a high percentage of calves unless the bull is permitted to run with the cows. The busy farmer will not see the cows at the right time. However, the breeder of registered animals should not allow the bull to run with the cows, as it is desirable that in such cases a record of the date of service be kept.

It is important that as many of the cows as possible produce calves each year; the idle cow is not only idle capital, but she is a constant consumer of farm products. The idle cow has a very important part to play in the total expense of raising a calf, as the expense of keeping her must be charged against the calves which other cows produce (see financial statement below). When there were 25 cows the owner had $750 invested in cattle (estimating each cow to be worth $30); of this amount only $540 was returning a profit when 72 per cent of the cows brought calves. In this case there were $210 invested in idle cattle; this amount represents the equivalent of 7 cows, and those 7 cows consumed $51.80 worth of feed in a year.

FINANCIAL STATEMENTS.

FEED EXPENSE TO GET A BEEF ANIMAL TO VARIOUS AGES.

As a rule the farmer charges nothing against the cost of raising a calf but the feeds consumed. Looking at it from this standpoint the cost of raising a calf, in this experiment, to various ages was as follows:

TABLE 5.—*Cost of raising a calf to various ages, charging feed only.*

(A) To 12 months:	
To winter feed of 1.39 cows the first winter	$6.81
To summer pasture of 1.39 cows	3.89
To summer pasture of 1 calf	1.40
Total cost	12.10
Cost per hundredweight	3.01
(B) To 24 months:	
To cost of 12-months-old calf	12.10
To winter feed of animal (12 to 24 months)[a]	4.90
To summer pasture (12 to 24 months)	2.80
Total cost	19.80
Cost per hundredweight	3.07
(C) To 30 months:	
To cost of 24-months-old steer	19.80
To winter feed of animal (24 to 30 months)[a]	4.90
Total cost	24.70
Cost per hundredweight	3.20
(D) To 33 months:	
To cost of 30-months-old steer	24.70
To summer pasture for one-half summer	1.40
Total cost	26.10
Cost per hundredweight	3.14

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[a] It is assumed that all animals over 12 months of age ate the same amount of feed, which assumption is, of course, not absolutely accurate. In rental practice, however, this assumption is carried out.

It should be understood that the different classes of animals were not kept separate and fed in different lots. They all ran together, so the above statement is only a close approximation of the cost of raising the animals to the various ages. It was assumed that all animals over 12 months of age ate the same amount of feed and pasture; it was further assumed that the animal under 12 months of age used only one-half as much pasture as the animal that was over 1 year old. The last assumption is in keeping with actual farm charges for pasture. It should be stated, also, that the cost to winter an animal was arrived at by dividing the total number of animals over 1 year old into the total cost of the feed consumed during the winter months.

When placing the value upon the feeds, as shown on page 13, it cost $12.10 to raise a 12-months-old calf, $19.80 if he was kept until he was 24 months of age, $24.70 to raise him to 2½ years old, and $26.10 to keep him until he was 33 months old. In other words, it cost about 3 cents a pound to grow the animal to various ages, when nothing but the feed and pasture was charged against him.

This feed bill could be materially reduced by extending the pasture grazing season. The pasture season could be extended at least two months, almost anywhere in the South, by the use of "spotted" bur clover (*Medicago maculata*). Bur clover is a winter-growing crop and occupies the ground in common with Bermuda grass, which makes its growth during the summer months.

EXTRA CHARGES AND CREDITS.

In estimating the cost of producing a beef animal it is usual to charge nothing against the animal but the winter feed and the pasture used. But there are other items that should be included, such as interest on the money invested in the cattle, mortality, depreciation in value of the cows, and other items. On the other hand, he should be credited with the manure produced. The following estimates charge the steer not only with the feeds used but the other items just mentioned, and give him credit for the approximate amount of manure produced:

TABLE 6.—*Cost of raising a calf to various ages. Total charges and credits.*

(A) To 12 months old:	
To winter feed of 1.39 cows	$6.81
To summer pasture of 1.39 cows	3.89
To summer pasture of calf	1.40
To 7 per cent interest on 1.39 cows at $30 per head	2.92
To 7 per cent interest on $\frac{1}{25}$ of a bull worth $150	.42
To annual depreciation in value of 1.39 cows, at $1.50 each	2.09
To pro rata depreciation of herd bull	.80

(A) To 12 months old—Continued.

To taxes, insurance, fencing, and repairs		$0.86
To 4 per cent mortality of 1.39 cows at $30 each		1.67
To 4 per cent mortality (insurance) on $\frac{1}{25}$ of bull		.24
Total		21.10
By 3,600 pounds of calf manure[a] at $1.25 a ton	$2.25	
By 15,012 pounds of cow manure (1.39 cows) at $1.25 a ton	9.38	
		11.63
Total expense of calf		9.47
Cost per hundredweight		2.35

(B) To 24 months old:

To cost at 12 months of age (manure not included)	21.10
To winter feed	4.90
To summer pasture	2.80
To 7 per cent interest on yearling	1.48
To taxes, insurance, repairs, etc	.86
To 4 per cent mortality	.84
Total	31.98
By 27,612 pounds of manure for 24 months at $1.25 a ton	17.26
Total expense of steer	14.72
Cost per hundredweight	2.28

(C) To 30 months old:

To cost at 24 months of age (manure not included)	31.98
To winter feed	4.90
To 7 per cent interest on 2-year-old animal for 6 months	1.12
To taxes, insurance, repairs, etc., for 6 months	.43
To 4 per cent mortality of 2-year-old animal for 6 months	.64
Total	39.07
By 33,012 pounds of manure for 30 months at $1.25 a ton	20.63
Total expense of steer	18.44
Cost per hundredweight	2.39

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[a] The totals in this table are computed on the basis of a year containing twelve 30-day periods, or 360 days in all. In estimating the amount of manure produced it was assumed that the animal under 1 year of age produced 20 pounds a day for 180 days; that the yearling produced 25 pounds a day for a year; and that the 2-year-old steer and the cow each produced 30 pounds a day. The price of manure, $1.25 a ton is an assumed one, as there was no way to determine its exact value. But, judging from the many tests that have been made at experiment stations, the above value is a very conservative one. For instance, as quoted in the introduction to this paper, the Ohio experiments showed raw manure to be worth $3.35 a ton when placed under the crops mentioned, and when the manure was treated with a phosphorous carrier its value was raised to $4.88 a ton. There was a difference, though, between the Ohio manure and the manure secured in the above tests; the Ohio manure was collected in the winter time when grains and hays were fed. It was a richer manure than that made during the summer months in this test, but probably no richer than the Alabama manures made during the winter months.

(D) To 33 months old:

To cost at 24 months old (manure not included)	$31.98
To winter feed	4.90
To 3 months pasture	1.40
To 7 per cent interest on 2-year-old animal for 9 months	1.68
To taxes, insurance, repairs, etc., for 9 months	.64
To 4 per cent mortality for 9 months	.96
Total	41.56
By 35,712 pounds of manure for 33 months at $1.25 per ton	22.32
Total cost of steer	19.24
Cost per hundredweight	2.31

It is seen that when a calf is charged with everything that could be charged against him, and then credited with the manure produced, the cost of making 100 pounds of gain was somewhat smaller than the figures obtained when nothing but the feed and pasture were taken into consideration.

The labor employed to feed and look after the animals was not included in the above estimate, as it was a very small item. One winter the labor to feed and care for the cattle was $10 for the whole herd. Another winter the total labor item was only $7.50. The method used in the feeding and handling involved the use of but little labor; the feeding was done but once a day, when the cotton seed and the hay were measured out to the cattle in a very few minutes.

When all of the expenses were charged against the animals and no credit was made for the manure, the expense of producing a steer varied from $4.96 to $5.25 per hundred pounds, as follows:

To 12 months of age, $5.25 per hundredweight.
To 24 months of age, $4.96 per hundredweight.
To 30 months of age, $5.05 per hundredweight.
To 33 months of age, $5.00 per hundredweight.

These figures mean that if the animals are sold for the above prices [a] the feeds used are marketed at a good farm price; all deaths are deducted; 7 per cent interest is received on the money invested in the animals; $2.50 an acre is secured as rent for the summer pasture; and finally the manure is secured free. Of course, in order that all these profits may be realized good cattle must be raised, it can not be done with scrubs; the scrub will not sell to advantage when he is offered to the butcher or packer, as his meat is of poor quality and he dresses out a low per cent of salable meat.

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[a] These prices can be realized for good cattle as is shown by the fact that 60 steers, of about the same quality as those in this test, were fed by the Bureau of Animal Industry and the Alabama Experiment Station and sold February 28, 1910, on the Louisville market for $5.75 per hundredweight.

It may be remarked, also, that the cattle upon this farm were not produced as cheaply as it is possible to raise them in the South. At least two farm practices can be introduced upon the average farm that will make it possible for steers to be raised much cheaper than was the case with these animals. In this test no winter pastures were used, except the winter range. Through the use of a combination of bur clover and Bermuda grass the pasture season can be extended at least two months in the year. The farmer who lives as far south as Greenville, Ala., can have a grazing pasture the year through by the use of Bermuda grass, bur clover, and velvet beans. In the second place the cattle were infested with the Texas tick, which reduced their average size considerably. Through the combined efforts of the Federal Government and the Southern States the tick is now being exterminated, and when this is accomplished the farmer can expect to raise larger cattle than formerly.

II. WINTERING STEERS PREPARATORY TO SUMMER FATTENING ON PASTURE.

Before proceeding with the feeding experiment which will be described in this and the succeeding part of this bulletin, it is desired to emphasize one point that was brought out very clearly in connection with the work reported in Part I, namely, that if money is to be made in raising beef for the market the steer must be properly finished before he is offered for sale. If the steer is sold unfinished, the man who raised him is almost sure to lose money on the operation.

The question arises, then, How shall the steer, after he has been raised, or has reached the feed-lot period, be finished for the market to get the greatest possible profit out of him? The steer can be finished in one of two ways; he can be fattened during the winter months, or he can be fattened during the summer months while the pastures are available. Since the cooperative work between the Bureau of Animal Industry and the Alabama Experiment Station began, some results have been published relative to winter fattening.[a] The results of two years' work in fattening cattle upon pasture during the summer months and selling the cattle at the end of the summer are here presented, dealing first with the general plan of the work and the wintering of the steers. It should be understood that this bulletin is only a report of the progress of the work, as the experiments are being continued.

DETAILS OF THE EXPERIMENT.

PLAN OF THE WORK.

The cattle were bought in the fall on account of the fact that they could be bought much cheaper in the fall than in the spring. In fact, they could hardly be bought at all in the spring. But they were not to be fattened until the following summer, so it became necessary to make a study of the cheapest and best methods of getting these mature steers through the winter months. The work was therefore divided into (1) a study of methods of wintering mature steers, and (2) fattening these steers on pasture the following summer. The cattle used in the winter's work were continued into the following summer's work.

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[a] Bureau of Animal Industry Bulletin 103.

Owing to the fact that pasture was not available upon the experiment station at Auburn, Ala., the work was carried on elsewhere upon farms whose owners kindly agreed to cooperate in the work. The winter range and summer pastures on these farms were divided into lots suitable for the work. One of the authors of this bulletin, Mr. W. F. Ward, was stationed upon the farm and had personal supervision of all the experimental work.

At the end of each experiment the cattle were all shipped to the New Orleans market, where complete sale and slaughter records were secured.

CATTLE USED.

The various pictures will show the kind of cattle which were used in these tests. Grade Aberdeen-Angus, Shorthorn, Hereford, and Red Polled were used, but many of them had a predominance of Jersey and scrub breeding. They were all bought of farmers in Sumter, Wilcox, Marengo, and neighboring counties, so they represented the average cattle of the western part of Alabama. They varied from 2 to 4 years of age. As will be seen later, the average weight at the beginning of the fall work was about 750 pounds each.

THE WINTER RANGE.

The winter range consisted of the winter corn and cotton fields. The leaves had not been stripped from the cornstalks. Crab grass had grown up sufficiently between the rows of corn, after the last cultivation, to be of some value to the cattle during the early weeks of the winter. No canebrakes were used. Of course the man who has canebrakes has an advantage in handling and feeding cattle in the winter time. The cattle, except those in the range lots, were not given unlimited range; each lot was confined to a certain area. Those animals which were confined in limited areas had about 10 acres each upon which to graze. The outside cattle or range lot had an unlimited grazing area. The winter range was available for use immediately after all the cotton had been picked.

METHOD OF FEEDING AND HANDLING THE CATTLE.

In both the winter and the summer work the steers were fed but once a day. In the winter time movable feed troughs were placed out in the fields in which to feed the hulls, cotton-seed meal, and cotton seed, and movable hay racks were made in which to feed the hay. The racks and troughs were all made movable, so that the manure would be distributed over the corn and cotton fields. Movable troughs were also used during the summer feeding on pasture. No feeds were thrown upon the ground.

No shelter, except trees, was provided for the cattle in either the winter or summer time. They had no access to sheds. They did not suffer to any appreciable extent from the cold in the winter time or from the heat in the summer time. The summer pastures were well provided with good shade trees. When a summer shade is provided, cattle will suffer no more from heat in Alabama than they will in Illinois or Iowa.

While there were ticks in the pastures, the cattle were not permitted to become badly infested with them; a dipping vat was used to keep down heavy infestation. In the two years' work, during which time over 300 head of cattle were fattened, there were only four cases of Texas fever, and none of these cases was lost. In future work it is expected that the tick will be entirely eliminated.

The weight of each steer was secured at the beginning and end of each test, and the total weight of each lot was noted every twenty-eight days. When the steers were sold they had to be driven 9 miles to the shipping point, Scooba, Miss.

CHARACTER AND PRICE OF FEEDS USED.

When the feeds were purchased upon the market the expense of hauling to the farm was added to the market price and used in making up the financial statement. When the feed used was grown upon the farm an assumed market price was placed upon it. Local conditions determine, to a large extent, the farm prices of feeds. Any prices that might be assumed would not meet all conditions, but the following prices have been taken as a basis upon which to make the financial estimates:

Cotton-seed meal	per ton	$26.00
Cotton seed	do	14.00
Cotton-seed cake	do	25.00
Cold-pressed cotton-seed cake	do	23.00
Cotton-seed hulls	do	6.00
Damaged hay	do	5.00
Cow-pea hay	do	10.00
Pasture, per steer	per month	.50

The above represents the prices of the purchased feeds laid down on the farm; the farm was 15 miles from the railroad station (Epes, Ala.) where the feeds were secured. The cotton-seed cake had been broken into nut size and sacked. This cake can be purchased in the large cake size, just as it comes from the press, for about $2 a ton cheaper than in the nut size. Some feeders find that it pays to break the cake on their own farms. The cake is the same thing as the cotton-seed meal, except that it is not ground into a meal. There are several advantages in feeding cake in place of cotton-seed meal, especially in summer feeding. A rain does not render the cake unpalatable, but will often put the meal in such a condition that the cattle will not eat it. Again, no loss is incurred with the cake during windy days; whereas the meal, when fed in the open pasture, is sometimes wasted on account of the winds. Furthermore, the cake requires chewing before being swallowed, and therefore must be eaten very much more slowly than the meal, so when a number of steers are being fed together the greedy one has little chance to get enough cake to produce scours. In feeding cotton-seed meal the greedy steer often scours because he can bolt the meal and get more than his share; this not only injures the steer but makes the bunch "feed out" unevenly.

The cold-pressed cotton-seed cake is a special cake which consists of everything in the seed except the oil. It is the residue after the oil has been extracted from the cotton seed by the cold process. These tests do not show it to be as valuable for feeding purposes as the ordinary cotton-seed cake. The chemical analysis of the cake fed, as reported by the State chemist, B. B. Ross, of Auburn, was as follows:

	Per cent.
Moisture	9. 75
Ash	4. 70
Fiber	21. 18
Protein	27. 62
Ether extract (fat)	8. 78
Carbohydrates	27. 97

For comparison with the above we insert the analysis of cotton-seed meal as given in Henry's Feeds and Feeding, as follows:

	Per cent.
Moisture	8. 2
Ash	7. 2
Fiber	5. 6
Protein	42. 3
Ether extract (fat)	13. 1
Carbohydrates	23. 6

The mixed hay was a second or third class hay that could not be sold upon the market at all. It consisted of a mixture of Johnson grass, crab grass, and some alfalfa. The price placed upon it was all it was worth. The cow-pea hay was bright and of good quality.

WINTERING THE CATTLE.

Farmers are not agreed as to what is the best way to handle and feed mature steers during the winter months. Some farmers claim that the animals should be "roughed" through the winter upon a very small amount of feed in addition to the winter range; some hold that the range needs no supplementary feed at all; still others believe that the steer should be fed liberally so that he will be kept gaining all through the winter months.

The cattle used in the winter work were dehorned, tagged, and divided into lots (three lots in the winter of 1907–8 and four lots in the winter of 1908–9), so that a study could be made of the amount of feed that should be fed during the winter time, and also to learn the value of some of the southern feeds for carrying cattle through the cold months.

RESULTS OF THE WINTER FEEDING.

The winters of 1907–8 and 1908–9 were both mild ones. There was no weather cold enough to make the steers suffer, although, as before mentioned, there was no shelter except a few trees. The following table shows the rations fed, total weights, and gains of each lot for the two winters:

TABLE 7.—*Results of winter feeding.*

WINTER OF 1907-8 (84 DAYS).

Lot.	Number of animals.	Ration.	Average initial weight of each steer.	Average final weight of each steer.	Average gain (+) or loss (−) of each steer.	Average daily gain (+) or loss (−) of each steer.
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1	26	Range alone	722	625	−97	−1.15
2	29	Range plus half ration cotton-seed meal and hulls	726	720	− 6	− .07
3	24	Range plus half ration cow-pea hay	724	715	− 9	− .11
		WINTER OF 1908-9 (98 DAYS).				
1	25	Range alone	705	599	−106	−1.08
2	25	Range plus half ration cotton-seed meal and hulls	705	708	+ 3	+ .03
3	25	Range plus half ration cotton-seed	706	666	− 40	− .40
4[a]	25	Range plus half ration cheap hay	689	649	− 40	− .57

[a] This lot started January 1, so fed only 70 days.

It was intended that the steers which received some feed in addition to the range should suffer no loss in weight during the winter months, but in some cases the loss was considerable during the latter part of the winter period when the range afforded very little grazing. The object was to give just enough feed, in addition to the range, to enable the cattle to hold their fall weight. No gains in live weight were desired. It should be remembered that these were all practically mature cattle, varying in age from 2 to 4 years.

During the first winter the experiment continued from December 10 to March 2, a period of eighty-four days. During this time the range cattle (lot 1) lost 97 pounds each in live weight, while the steers in lots 2 and 3 practically held their fall weights. All of the cattle came through the winter in excellent health, and while those in the range lot were thin, they were in good condition for grazing; they evidently had not been weakened in any way. At the opening of spring the steers in the cow-pea hay lot (lot 3) seemed to be in better thrift than those in lot 2 (the cotton-seed meal and hulls lot), although they made practically the same gains in weight. The hay used in 1907–8 was good in quality.

During the winter of 1908–9 the test continued from December 4 to March 11, a period of ninety-eight days. There were practically the same losses as the previous winter in lots 1 and 2. The steers in lots 3 and 4 lost rapidly in weight the last month of the test, due to the fact that the grazing on the range was not good at the end of the season; it was not intended that they should shrink in weight. Lot 4 was not started in the test until January 1, so the cattle in this lot were fed only seventy days. The hay used in lot 4 was a very cheap hay; it was made up of a mixture of Johnson grass, crab grass, and some alfalfa, but had been damaged by rain to such an extent that it could not be sold at all.

AMOUNT OF WINTER FEEDS USED.

During the first winter (1907–8) a comparison was made between feeding on the range alone and the same when supplemented in one lot with a part ration of cotton-seed meal and hulls, and in a third lot with a good quality of cow-pea hay. The following winter (1908–9) the same comparison was again made as regards lots 1 and 2, while in a third lot cotton seed, and in a fourth lot some damaged mixed hay were used to supplement the range.

TABLE 8.—*Quantity of winter feeds used.*

WINTER OF 1907-8 (84 DAYS).

Lot.	Number of steers in lot.	Ration.	Total amount consumed per steer.		Daily amount feed consumed per steer.	
			Concentrates.	Roughage.	Concentrates.	Roughage.
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1	26	Range alone	None.	None.	None.	None.
2	29	Range plus half ration cotton-seed meal and hulls	197	714	2.35	8.5
3	24	Range plus half ration cow-pea hay	None.	714	None.	8.5
		WINTER OF 1908-9 (98 DAYS).				
1	25	Range alone	None.	None.	None.	None.
2	25	Range plus half ration cotton-seed meal and hulls	236	854	2.41	8.71
3	25	Range plus half ration cotton seed	462		4.71	
4[a]	25	Range plus cheap mixed hay		826		11.8

[a] This lot was fed only seventy days—January 1 to March 12.

During each year's work those steers that received feed in addition to the range were started on a very small daily allowance. This amount was increased every few days for twenty-eight days, when it was held uniform for the remainder of the winter.

There was no way to determine how much feed was secured from the range as far as weight was concerned. Each steer had about 10 acres as a winter range. The steers in lot 1, the range lot, had to be turned out upon the general range each winter about a month before the end of the test, as their range of 10 acres each had become exhausted about thirty days earlier than was the case with those lots which were receiving supplementary feeds.

During the first winter each steer in lot 2 consumed, in addition to the range, 197 pounds of cotton-seed meal and 714 pounds of hulls, while each steer the second winter ate 236 pounds of cotton-seed meal and 854 pounds of hulls. But the animals were fed fourteen days longer the second than the first winter. Each steer's daily ration was kept a little below 2.5 pounds of cotton-seed meal and from 8.5 to 8.71 pounds of hulls.

During the second winter the steers in lot 3 were carried through the winter on cotton seed as a supplement to the range. It was learned that 4.71 pounds of cotton seed per steer per day was not quite sufficient to keep the animals from losing weight. Each steer lost 39.6 pounds in weight during the winter period of ninety-eight days.

In the first winter's work it is seen that 8.5 pounds of good peavine hay, along with the range, afforded the steers sufficient daily feed to allow them to maintain a practically uniform weight. Or, when lots 2 and 3 (1907–8) are compared, it is seen that 714 pounds of cow-pea hay were practically equal in feeding value to 197 pounds of cotton-seed meal plus 714 pounds of cotton-seed hulls. In other words, the cow-pea hay was worth $13.02 per ton for wintering mature cattle compared with cotton-seed meal and hulls, when the meal is valued at $26 a ton and the hulls at $6 a ton.

During the second winter (1908–9) each steer in the cotton-seed lot (lot 3) lost about 43 pounds more in live weight than the animals in the cotton-seed meal and hulls lot (lot 2), but still, when cotton seed is valued at $14 a ton, it is probably cheaper than cotton-seed meal and hulls for wintering steers.

The daily expense of feeding each steer on cotton-seed meal and hulls was 5.7 cents, while the daily cost of the cotton seed alone per steer was only 3.3 cents. While not enough cotton seed was used to prevent loss in weight, still the amount fed daily to each steer (4.71 pounds) would probably not have to be increased very much to make the steers hold their fall weights. It would require 8.2 pounds of cotton seed, at $14 a ton, to cost as much as the 2.41

pounds of cotton-seed meal plus the 8.71 pounds of hulls which were fed to each steer daily in lot 2.

It should be remembered that these were mature steers, and that such steers are capable of making use of the rough waste feeds during the winter months. Cattle of this age can use feeds that would be entirely unsuited to young growing animals. In handling and feeding mature steers during the winter months the object should be to make use of all the rough feeds and unsalable hays before any high-priced feeds, as cotton-seed meal, are used.

GAINS AND LOSSES OF STEERS BY MONTHS.

Every southern farmer has old corn and cotton fields which afford some winter feeds for the cattle, but as the winter advances the range usually affords a smaller and smaller amount of feed. The following table shows the gain or loss of the various lots from month to month. From this the reader can gather some idea of when the heavy losses usually occur and regulate the amount of supplementary feeds accordingly.

TABLE 9.—*Results of winter feeding by months.*

WINTER OF 1907-8 (84 DAYS).

Lot.	Ration.	Gain (+) or loss (−) per steer, first month, December 10 to January 7.	Gain (+) or loss (−) per steer, second month, January 7 to February 4.	Gain (+) or loss (−) per steer, third month, February 4 to March 3.
		Pounds.	*Pounds.*	*Pounds.*
1	Range alone	− 4	−38	−55
2	Range plus half ration cotton-seed meal and hulls	+16	−10	−12
3	Range plus half ration cow-pea hay	+15	−16	− 8

WINTER OF 1908-9 (98 DAYS).

		December 4 to January 1.	January 1 to January 29.	January 29 to February 26.	February 26 to March 12.
1	Range alone	−40	−43	− 7	−16
2	Range plus half ration cotton-seed meal and hulls.	+18	−12	− 5	+ 2
3	Range plus half ration cotton seed	0	−16	−46	+22
4	Range plus cheap mixed hay		−13	−23	− 4

In the first winter's work the range cattle (lot 1) practically held their initial weight during the first twenty-eight days. As time went on and the range became shorter and shorter they lost more and more in weight. This is what should be expected. But the heaviest losses in 1908–9 were experienced at the early part of the winter. However, this winter was an unusual one. It was very rainy and muddy during the early months, so that the cattle were very uncomfortable and could not graze well. During the last of the winter very little rain fell and spring set in early, so, as a matter of fact, the range cattle had some green feed during the last month in addition to the range. The table shows that all the lots except lot 1 showed considerable improvement in the last two weeks of the winter period of 1909.

As stated elsewhere, all of these cattle came through the winter in good grazing condition; they were strong and active, although the steers in the range lots (lot 1) had fallen off in live weight about 100 pounds each.

FINANCIAL STATEMENT FOR WINTER WORK.

In the fall of 1907 the steers cost $2.50 per hundredweight, but the next fall, 1908, feeders had advanced some in price, making the fall price average $2.56 per hundredweight. In the spring the cost was, of course, considerably greater than the fall price for two reasons: First, the cattle were not as heavy as they were the previous fall, and second, the cost of winter feed had to be added to the fall price. The fall cost, added to the depreciation in live weight, and the cost of winter feed made the steers cost about $3 per hundredweight in the spring. The following table, No. 4, shows the spring cost by lots. The average of these spring costs was taken as the initial cost of the steers in the summer feeding work which followed. The average cost of wintering each steer in the various lots, together with the difference in value between fall and spring, are as follows:

TABLE 10.—*Financial statement.*

1907–8.		
Lot 1. Range alone:		
To 722-pound steer, at $2.50 per hundredweight	$18.05	
By value of same steer in spring, 625 pounds, at $2.89 per hundredweight		$18.05
	18.05	18.05
Lot 2. Range plus cotton-seed meal and hulls:		
To 726-pound steer, at $2.50 per hundredweight	18.15	
To 714 pounds cotton-seed hulls, at $6 per ton	2.14	
To 197 pounds cotton-seed meal, at $26 per ton	2.56	
By value steer in spring, 720.5 pounds, at $2.89 per hundredweight		20.82
By required increase in value over range steer to break even (28 cents per hundredweight)		2.03
	22.85	22.85

1907-8.

Lot 3. Range plus peavine hay:

To 724-pound steer, at $2.50 per hundredweight	$18.10	
To 714 pounds peavine hay, at $10 per ton	3.57	
By value steer in spring, 715 pounds, at $2.89 per hundredweight		$20.65
By required increase in value over range steer to break even (14 cents per hundredweight)		1.02
	21.67	21.67

1908-9.

Lot 1. Range alone:

To 705-pound steer, at $2.56 per hundredweight	18.05	
By value same steer in spring, 599 pounds, at $3.01 per hundredweight		18.05
	18.05	18.05

Lot 2. Range plus cotton-seed mealand hulls:

To 705-pound steer, at $2.56 per hundredweight	18.05	
To 854 pounds cotton-seed hulls, at $6 per ton	2.56	
To 236 pounds cotton-seed meal, at $26 per ton	3.07	
By value steer in spring, 708 pounds, at $3.01 per hundredweight		21.31
By required increase in value over range steer to break even (33 cents per hundredweight)		2.37
	23.68	23.68

Lot 3. Range plus cotton seed:

To 706-pound steer, at $2.56 per hundredweight	18.07	
To 462 pounds cotton seed, at $14 per ton	3.23	
By value steer in spring, 666 pounds, at $3.01 per hundredweight		20.05
By required increase in value over range steer to break even (19 cents per hundredweight)		1.25
	21.30	21.30

Lot 4. Range plus cheap hay:

To 703-pound steer, at $2.56 per hundredweight	18.00	
To 826 pounds waste hay, at $5 per ton	2.06	
By value steer in spring, 649 pounds, at $3.01 per hundredweight		19.53
By required increase in value over range steer to break even (8 cents per hundredweight)		.53
	20.06	20.06

The total cost to winter each steer in 1907-8 was $4.70 and $3.57 in lots 2 and 3, respectively. The range has no price placed upon it, although the results show that it has a very great value. The total cost to winter each steer in 1908-9 was $5.63, $3.23, and $2.06 in lots 2, 3, and 4, respectively.

After the cost of wintering the cattle and the winter shrinkage were added to the fall buying price the spring cost was obtained. The spring costs in lots 1, 2, and 3 in 1907-8 were $2.89, $3.17, and $3.03 per hundredweight, respectively. In 1908-9 the spring costs were $3.01, $3.34, $3.20, and $3.09 per hundredweight in lots 1, 2, 3, and 4, respectively.

It is seen that the cheap coarse feeds produced about as good results as the high-priced feeds, while the steers were carried through the winter much more economically with the cheap than with the expensive feeds. It will always pay to make use of the coarse or cheap winter feeds for the mature steers and save the high-priced feeds for the young animals of the farm.

It is well known that the effects of feeding mature cattle through the winter months continue throughout the following grazing season. Those mature cattle that experience the least loss in weight during the winter may be expected to make the smallest gains the following summer. This has been found to be true in this work, but a detailed presentation of this point will be found in a later publication.

TABLE 11.—*Total summary of winter work.*

Item.	1907-8 (84 days).			1908-9 (98 days).			
	Lot 1, range alone.	Lot 2, range and cotton-seed meal and hulls.	Lot 3, range and cowpea hay.	Lot 1, range alone.	Lot 2, range and cotton-seed meal and hulls.	Lot 3, range and cotton seed.	Lot 4, range and waste hay.
Average weight of steers at beginning of test....pounds..	722	726	724	705	705	706	689
Average weight at end of test....do....	625	720	715	599	708	666	649
Total gain (+) or loss (—) per steer for whole winter....pounds..	—97.	— 6.	— 9.	—106	+ 3.	—40.	—40.
Average daily gain (+) or loss (—) per steer, pounds....	— 1.15	— .07	— .11	— 1.08	+ .03	— .41	— .57
Concentrates consumed per steer per day, pounds....	....	2.35	....	....	2.41	4.71	....
Roughage consumed per steer per day, pounds....	....	8.5	8.5	....	8.71	....	11.8
Average expense to winter each steer....	....	$4.70	$3.57	....	$5.63	$3.23	$2.06
Initial, or fall cost of steers per hundredweight.	$2.50	$2.50	$2.50	$2.56	$2.56	$2.56	$2.56
Total cost of steers per hundredweight following spring....	$2.89	$3.17	$3.03	$3.01	$3.34	$3.20	$3.09

SUMMARY OF WINTER WORK.

1. The cattle used in all of these tests were practically mature ones.

2. Winter rations used:

	1907-8.	1908-9.
Lot 1....	Range alone....	Range alone.
Lot 2....	Range plus half ration cotton-seed meal and hulls.	Range plus half ration cotton-seed meal and hulls.
Lot 3....	Range plus half ration peavine hay....	Range plus half ration cotton seed.
Lot 4....	....	Range plus half ration cheap hay.

3. In 1907–8 each range steer (lot 1) lost 97 pounds in weight. In 1908–9 each range steer (lot 1) lost 106 pounds in weight.

4. In 1907–8 each steer in lot 2 received 2.35 pounds of cotton-seed meal and 8.5 pounds of hulls each day in addition to the range.

During the winter of 1908–9 each steer in lot 2 received 2.41 pounds of cotton-seed meal and 8.71 pounds of hulls daily. The first year each steer lost 6 pounds in weight; the second year each steer gained 3 pounds in weight.

5. In 1907–8 each steer in lot 3 was fed a daily ration of 8.5 pounds of good cowpea hay in addition to the range; the loss in weight per steer for the winter was 9 pounds.

6. In 1908–9 cotton seed was tried as a supplement to the range, 4.71 pounds being fed to each steer daily. The loss in weight per steer for the winter was 40 pound.

7. In 1908–9 cheap hay was used in lot 4 to supplement the range, 11.8 pounds being fed to each steer daily. The winter loss per steer was 40 pounds.

8. The total cost to winter each steer in 1907–8 was $4.70 and $3.57 in lots 2 and 3, respectively. The total cost to winter each steer in 1908–9 was $5.63, $3.23, and $2.06 in lots 2, 3, and 4, respectively.

9. In 1907–8 the fall buying price was $2.50 per hundredweight. When the expense of wintering the steers was added to the fall price the spring prices were found to be $2.89, $3.17, and $3.03 per hundredweight in lots 1, 2, and 3, respectively.

10. In 1908–9 the fall buying price was $2.56 per hundredweight. When the expense of wintering the steers was added to the fall price the spring prices were found to be $3.01, $3.34, $3.20, and $3.09 per hundredweight in lots 1, 2, 3, and 4, respectively.

III. FATTENING CATTLE ON PASTURE.

INTRODUCTION.

As a rule the ordinary permanent pastures in Alabama can be depended upon to furnish grazing from about April 1 to some time in October. The frosts usually kill the pastures in October. By making use of winter-growing plants, such as bur clover, the grazing season can be opened about February 1, and sometimes even earlier.

A common mistake is to overstock the pastures. When this is done the grass often becomes short in August and September, and the cattle actually lose in weight instead of gaining. Furthermore, the South often experiences a drought in August and September, therefore the farmer should have no more cattle on hand than can be well cared for during the grazing period.

The pastures used in this test, as stated before, were made up of several kinds of grasses. No one kind of plant was depended upon entirely. Johnson grass, Japan clover, and sweet clover were the most important grazing plants used. In addition to these some Bermuda and crab grasses were also found. If the pastures are to be improved year by year and the grazing season extended over as many months as possible, several plants must be made use of.

The cattle used in the summer feeding work were the same as had been used in the preceding winter's experimental work, except that some steers which had not been in the winter experiment were added to the summer work. These extra steers had been fed nothing through the winter months except what they obtained on the open range. They were of the same quality as the steers which had been in the winter tests. All of these cattle had been dehorned the previous winter. There were, in addition, a mixed lot of scrub steers (lot D), which are described later on. When grass appeared in the spring the winter work was discontinued, the cattle were redivided into lots, and the summer feeding work was begun immediately.

THE SUMMER PASTURE.

The summer pasture used in these experiments consisted of a mixture of sweet clover (Melilotus), Japan clover (Lespedeza), Johnson grass, crab grass, and some Bermuda grass. The sweet clover became available for grazing about April 1, while the Japan clover was not ready until about June 15. In some sections of the country sweet clover is considered a pest, as stock will not eat it, but in the South, or at least in Alabama, all kinds of stock eat it with great relish; they take to it as readily as to alfalfa.

The pasture was divided into lots, the size of each lot depending upon the number of cattle grazed upon it, and as to whether the steers were to be fed a concentrated supplement or not. The object was to have an abundance of pasture for each bunch of cattle. The method of feeding and handling the cattle has already been described in connection with the winter work.

DETAILS OF THE SUMMER FEEDING.

FEEDS CONSUMED.

The cattle were fed but once a day; this was done each afternoon about sundown, or in the cool of the evening, in order that the steers would all come out to the feed troughs. The steers were started upon a small amount of feed, and as they became accustomed to it the amount was gradually increased. The following tables will show that the concentrates were fed sparingly all through the tests.

Table 12 shows the total amount of concentrates fed each steer for each year, the average daily feed, and the amount of concentrates required to make 100 pounds of gain.

TABLE 12.—*Feeds consumed.*

Lot.	Number cattle in lot.	Ration.	Total amount feed consumed per steer.	Amount feed consumed per steer per day.	Pounds feed to make 100 pounds gain.
		1908 (112 DAYS).			
			Pounds.	*Pounds.*	*Pounds.*
A	26	Pasture alone			
B	26	Pasture plus cotton-seed cake	371	3. 31	143
C	26	Pasture plus cold-pressed cotton-seed cake	371	3. 31	180
D[a]	54	Pasture plus cotton-seed cake	309	2. 76	171
		1909 (154 DAYS).			
A	40	Pasture alone			
B	75	Pasture plus cotton-seed cake	524	3. 40	181
E	25	Pasture plus cotton seed	691	4. 49	218

[a] The cattle in lot D were not of the same grade as those in the other lots and are hardly comparable with them. Lot D was made up of a bunch of cattle with no special breeding, and they ranged from 2 to 5 years in age. The object in handling this lot was to see if money could be made on such cattle. They had not been dehorned.

Lot A received no feed in addition to the pasture as one object was to learn whether it would pay to supplement the pasture with a concentrate. During the summer of 1908 each steer in lot B was given 3.31 pounds of cotton-seed cake in addition to the pasture; in 1909 each steer in this lot was fed 3.4 pounds of the cake in addition to the pasture. In 1908 the cold-pressed cotton-seed cake was used with one lot so that its value as a feed could be compared with ordinary cotton-seed cake. The steers in lot D (the mixed lot) in 1908, on account of being smaller than the ones in the other lots, were fed only 2.76 pounds of cotton-seed cake per head per day. In 1909 cotton seed was fed to lot E.

When looking at the last column it is seen that the cotton-seed cake was more efficient than the cold-pressed cake for making gains. In 1908 only 143 pounds of the former were required to make 100 pounds gain, while 180 pounds of the latter were required to make the same number of pounds gain (lot D is not used in this comparison for reasons previously stated). It is true that the cold-pressed cake did not cost as much as the regular cotton-seed cake, but it will be seen later, when the cost of the feeds are taken into consideration, that the cotton-seed cake was the more economical feed to use. Under the conditions of this test 1 pound of cotton-seed cake was equal in feeding value to 1.26 pounds of the cold-pressed cake.

During the summer of 1909 a direct comparison was made between cotton-seed cake and cotton seed as feeds to be used to supplement pastures. Under the conditions of this test 1 pound of cake proved to be equal to 1.20 pounds of the seed. The seed proved to have an exceedingly high feeding value when used as a feed to supplement the pastures.

The steers in lot D were a bunch of mixed scrubs, varying from 2 to 5 years in age. There was very little improved blood among these cattle. They were not dehorned, so they were always restless at the feed trough, as the timid ones were afraid of the steers with long sharp horns. This lot was fed as a side issue to the main experiment to determine whether a profit could be made upon this class of cattle.

There was no way, of course, to determine just how much pasture grass was consumed, except as to the area measured off for each lot. But it is interesting to note that the amount of concentrated feeds required to make 100 pounds increase in live weight was exceedingly small. This was due to at least two factors. First, the steers had a green feed to go along with the concentrated feeds. Second, the amount of concentrated feeds fed daily was held down to a few pounds, thus requiring the steers to obtain the major part of their feed from the pasture. Where lands are cheap pasture is cheaper than the too liberal use of concentrated feeds. It is impossible, at the present time, to say whether the amounts fed in these tests were the correct ones or not, but it is hoped that some light may be thrown upon this point, during the further progress of the work.

GAINS MADE.

The gains as recorded in the following table will show that the pastures used were good ones. It should be remembered, too, that as a result of feeding the cattle upon these pastures the latter are getting better and better as time goes on. The table sets forth the total and daily gains of the steers during the summers of 1908 and 1909.

TABLE 13.—*Total and daily gains during the pasture-feeding test.*

1908 (112 DAYS).

Lot.	No. of steers in lot.	Ration.	Average initial weight per steer.	Average final weight per steer.	Total gain per steer.	Average daily gain per steer.
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
A	26	Pasture alone	732	902	170	1.52
B	26	Pasture plus cotton-seed cake	739	999	260	2.32
C	26	Pasture plus cold-pressed cotton-seed cake	738	944	206	1.84
D	54	Pasture plus cotton-seed cake	532	713	181	1.62

1909 (154 DAYS).

Lot.	No. of steers in lot.	Ration.	Average initial weight per steer.	Average final weight per steer.	Total gain per steer.	Average daily gain per steer.
A	40	Pasture alone	647	915	268	1.74
B	75	Pasture plus cotton-seed cake	639	929	290	1.88
E	25	Pasture plus cotton seed	653	970	317	2.06

It is seen that in every case those cattle that received some supplementary feed gained more rapidly than those which received no feed but pasture. Of course, the more rapidly a steer gains the quicker he can be gotten in shape for the market, and this is a very important point, as the early fall steer does not come into competition with the fall stock that is being brought into the market off grass.

As far as gains were concerned, the cattle did reasonably well both years. They were not grazed through the whole summer season, so the total gains, as represented in the sixth column, do not represent as great gains as can be made during a whole summer's grazing season. In 1908 they were grazed only one hundred and twelve days, and in 1909 the test continued for one hundred and fifty-four days. The best portion of the grazing season had been used, however, as the cattle were sold in the first part of September.

In both years the cattle which received cotton-seed cake in addition to the pasture gained more rapidly than the pasture cattle. In 1908 the difference in favor of the cattle which had been fed the cake was very marked, but in 1909 the difference between the two lots was not very pronounced. In 1909 lot E, the cotton-seed lot, made the most satisfactory gains, they making an average daily gain of 2.06 pounds, while lots B and A made average daily gains of 1.88 and 1.74 pounds, respectively.

COST OF GAINS.

It is always unsatisfactory to discuss the cost of gains, as this depends largely upon the cost of the feeds, which varies greatly under different conditions. In this discussion the price placed upon the feeds is the actual market quotation plus the expense of hauling them from the depot to the farm. The hauling distance was 15 miles. Pasture is charged at 50 cents per month per steer; this is the prevailing price placed upon pastures throughout the western part of Alabama.

TABLE 14.—*Cost to make 100 pounds of gain.*

1908 (112 DAYS).

Lot.	Ration.[a]	Pounds feed to make 100 pounds gain.	Cost 100 pounds gain, pasture not charged.	Cost 100 pounds gain, pasture charged.
A	Pasture alone	....	....	$1.18
B	Pasture plus cotton-seed cake	143	$1.79	2.56
C	Pasture plus cold-pressed cotton-seed cake	180	2.07	3.04
D	Pasture plus cotton-seed cake	171	2.14	3.04

1909 (154 DAYS).

Lot.	Ration.[a]	Pounds feed to make 100 pounds gain.	Cost 100 pounds gain, pasture not charged.	Cost 100 pounds gain, pasture charged.
A	Pasture alone	....	....	$1.03
B	Pasture plus cotton-seed cake	181	$2.26	3.21
E	Pasture plus cotton-seed	218	1.53	2.39

[a] Price of feeds: Cotton-seed cake, $25 per ton; cold-pressed cotton-seed cake, $23 per ton; cotton seed, $14 per ton; pasture, 50 cents per month.

In every case above the cost to make 100 pounds increase in live weight was very low. When steers are fattened during the winter time each pound of gain is put on at a loss, as each pound put on may be expected to cost from 8 to 12 cents, and the profit is, of course, dependent upon the enhancement of the value of the steer over and above the selling value of pounds of gain made. In these tests each pound put on during the fattening period was put on at a profit. These cheap finishing gains made the feeding operations comparatively safe as far as profits were concerned. As stated before, these cheap gains were due to two factors. First, the cattle had a cheap and succulent roughage—pasture. Second, the amount of concentrated feeds used was kept down to a comparatively small figure; from 2.76 to 3.31 pounds of cotton-seed cake and 4.49 pounds of cotton-seed were fed to each steer daily. At the Missouri station (see Bulletin 76) the average of the summer trials shows that 814 pounds of grain were required to produce 100 pounds of gain, while in our test only 143 to 218 pounds of concentrate were required to make the same gains. At Missouri the steers were given an approximate daily feed of 20 pounds of grain in addition to the pasture. It may be mentioned, also, that while the Missouri cattle were fed a much heavier grain ration than ours, the records show that the Alabama cattle made almost as large daily gains as the Missouri steers.

When lots B and C (1908) are compared it is seen that the cotton-seed cake is superior to the cold-pressed cake, as 100 pounds of increase in weight were made at a cost of $2.56 when the former cake was used, whereas when the latter cake was fed the same gains cost $3.04. When regular cotton-seed cake sells at $25 a ton the cold-pressed cake is not worth $23 a ton. When cotton-seed cake sells at $25 a ton this test shows the cold-pressed cake containing the hulls to be worth $19.83 a ton on a comparative basis.

The common or mixed bunch of cattle (lot D) make a very poor showing when compared with lots B and C, although, as will be seen later, the steers in lot D returned a small profit.

In comparing lots B and E (1909) it is seen that the cotton seed produced gains more cheaply than did the cotton-seed cake; that is, when the seed is valued at $14 a ton and the cake at $25 a ton. When cotton-seed cake is valued at $25 a ton, this test shows the cotton seed to be worth $20.76 a ton for fattening cattle on pasture. Cotton seed has this disadvantage, however, that during the latter part of the feeding period it is not relished as much as the cake, and some trouble was experienced in keeping the steers "on feed." There was no trouble from scouring when the seed was fed in the above amounts.

FINANCIAL RESULTS OF SUMMER FEEDING.

Although the cattle that received pasture alone made cheaper gains than those that received some feed in addition to the pasture, it must not be inferred that the grass cattle were the most profitable ones; the cost of the gains alone does not determine the final profits. While it is desirable to make the gains as cheaply as possible, still the selling price of the cattle at the end of the feeding period must also be taken into consideration before the final profit can be determined.

TABLE 15.—*Financial statement.*

1908.

Lot A. Pasture alone:		
To 26 steers, 19,031 pounds, at $2.92 per hundredweight	$555.71	
To pasture, at 50 cents a month per steer	52.00	
To freight, commission, feed, and yardage	94.12	
Total expenditures	701.83	
By sale of 26 steers, 21,210 pounds, at $3.66 per hundredweight		$776.29
Total profit on lot	74.46	
Profit per steer	2.86	

1908.

Lot B. Pasture plus cotton-seed cake:

To 26 steers, 19,199 pounds, at $2.92 per hundredweight	$560. 61	
To pasture, at 50 cents a month per steer	52. 00	
To 9,646 pounds of cotton-seed cake, at $25 per ton	120. 57	
To freight, commission, feed and yardage	94. 12	
Total expenditures	827. 30	
By sale of 26 steers, 24,245 pounds, at $4.53 per hundredweight		$1, 098. 30
Total profit on lot	271. 00	
Profit per steer	10. 42	

Lot C. Pasture plus cold-pressed cotton-seed cake:

To 26 steers, 19,176 pounds, at $2.92 per hundredweight	559. 94	
To pasture, at 50 cents a month per steer	52. 00	
To 9,646 pounds of cake, at $23 per ton	110. 93	
To freight, commission, feed, and yardage	94. 12	
Total expenditures	816. 99	
By sale of 26 steers, 22,740 pounds, at $4.35 per hundredweight		989. 19
Total profit on lot	172. 20	
Profit per steer	6. 62	

Lot D. Pasture plus cotton-seed cake:

To 54 steers, 28,754 pounds, at $2.50 per hundredweight	718. 85	
To pasture, at 50 cents a month per steer	108. 00	
To 16,686 pounds of cotton-seed cake, at $25 per ton	208. 57	
To freight, commission, feed, and yardage	195. 48	
Total expenditures	1, 230. 90	
By sale of 54 steers, 36,450 pounds, at $3.44 per hundredweight		1, 253. 88
Total profit on lot	22. 98	
Profit per steer	. 43	

1909.

Lot A. Pasture alone:

To 40 steers, 25,879 pounds, at $2.95 per hundredweight	763. 43	
To pasture, at 50 cents a month per steer	110. 00	
To freight, commission, feed, and yardage	144. 80	
Total expenditures	1, 018. 23	
By sale of 40 steers, 34,314 pounds, at $3.79 per hundredweight		1, 300. 50
Total profit on lot	282. 27	
Profit per steer	7. 06	

Lot B. Pasture plus cotton-seed cake:

To 75 steers, 47,916 pounds, at $2.95 per hundredweight	1, 413. 52	
To pasture, at 50 cents a month per steer	206. 25	
To 39,325 pounds of cotton-seed cake, at $25 per ton	491. 56	
To freight, commission, feed, and yardage	271. 50	
Total expenditures	2, 382. 83	

1909.

Lot B. Pasture plus cotton-seed cake—Continued.		
By sale of 75 steers, 66,514 pounds, at $4.37 per hundredweight		$2,906.66
Total profit on lot	$523.83	
Profit per steer	6.99	
Lot E. Pasture plus cotton seed:		
To 25 steers, 16,328 pounds, at $2.95 per hundredweight	481.68	
To pasture, at 50 cents a month per steer	68.75	
To 17,265 pounds of cotton seed, at $14 per ton	120.85	
To freight, commission, feed, and yardage	90.50	
Total expenditures	761.78	
By sale of 25 steers, 22,858 pounds, at $4.25 per hundredweight		971.46
Total profit on lot	209.68	
Profit per steer	8.39	

It should be noted that the total profits shown above are based on estimates after pasture rent, freight, commission, feed, etc., are taken from the total sales.

In 1908 it cost $3.85 per head to get the steers to the New Orleans market, and in 1909 the expense was $3.62 per head. These cattle were shipped from western Alabama to New Orleans, a distance of about 500 miles; many farmers in the South are not required to ship their cattle this distance.

In 1908 the greatest profits were realized upon lot B, the lot which received cotton-seed cake in addition to the pasture; in this lot a net profit of $10.42 per steer was made. Lot C, the lot fed on cold-pressed cake, returned a net profit of $6.62 per steer. The pasture lot, lot A, made a profit of only $2.86 per steer. It paid to feed the cattle some feed in addition to the pasture, because when offered for sale the steers thus fed were in much better condition than those that received pasture only, and consequently sold for more money per hundredweight. The grass cattle sold for $3.66 per hundredweight, the cotton-seed cake cattle for $4.53 per hundredweight, and the cattle fed on cold-pressed cake for $4.35 per hundredweight. The above represent the New Orleans prices. It cost about 60 cents per hundredweight, including shrinkage, to ship the steers to New Orleans.

In 1909 there was not a very great difference in favor of the lots which received feed in addition to the pasture. In fact, the pasture lot, lot A, and the cotton-seed cake lot (lot B) made practically the same profit, the former making a net profit of $7.06 per steer and the latter a net profit of $6.99 per steer. But the cotton-seed lot (lot E) was more profitable than either of the others, making a net profit of $8.39 per steer. The profits in every case were exceedingly satisfactory.

In 1908 it proved to be exceedingly profitable to supplement the pasture with a concentrated feed. In 1909 practically no extra profit was made as a result of the use of cotton-seed cake, but when cotton seed was fed along with the pasture the profits were greater than when pasture was used alone. The data so far collected warrant the statement that it pays to supplement the southern pastures with a concentrated feed when cattle are being finished for the fall market. Additional experimental work will determine what concentrated feeds can be used to the greatest advantage.

SLAUGHTER RESULTS.

The cattle were shipped to New Orleans for sale and were there slaughtered. Complete individual slaughter records were secured from the abattoir. Some of the details are presented in the table below, the remainder being reserved for a fuller discussion in a subsequent publication:

TABLE 16.—*Slaughter data.*

1908.

Lot.	Ration.	Average farm weight of steers.	Average New Orleans weight of steers.	Average shrinkage in shipping.	Percentage dressed of farm weight.	Percentage dressed of New Orleans weight.
		Pounds.	*Pounds.*	*Pounds.*		
A	Pasture alone	902	816	86	49.5	53.1
B	Pasture plus cotton-seed cake	999	933	66	53.8	55.9
C	Pasture plus cold-pressed cotton-seed cake	944	874	70	53.6	56.1
D[a]	Pasture plus cotton-seed cake	724	686	38	52.7	53.8
	1909.					
A[b]	Pasture alone	916	859	57	51.8	53.6
B[c]	Pasture plus cotton-seed cake	941	899	42	54.2	55.0
E[d]	Pasture plus cotton seed	1,001	946	55	53.9	55.3

[a] Slaughter data secured on 45 head only, figures on basis of those.
[b] These figures based on the slaughter data of 28 head at New Orleans.
[c] These figures based on the slaughter data of 48 head at New Orleans.
[d] These figures based on the slaughter data of 19 head at New Orleans.

It is seen by the above table that the steers which were given some feed in addition to the pasture suffered less loss from shipping than the ones which had nothing to eat but pasture. In 1908 each pasture steer (lot A) lost 86 pounds in transit, while those which had been fed some concentrated feeds averaged from 38 to 70 pounds for each lot. The common cattle, lot D, suffered a very small shrinkage, which was due, in part, to their being smaller steers than the other cattle. The cattle did not shrink as much in 1909 as in 1908, but in 1909 the grass cattle lost considerably more weight in transit than did those that had been fed.

In both years the steers which had been fed the cotton-seed products dressed out several per cent higher than the grass cattle. In 1908 the grass cattle dressed out 49.5 per cent; in 1909 a similar lot dressed out 51.8 per cent. The cattle which had been given some concentrated feeds along with the pasture dressed about 54 per cent. It should be noted that the next to the last column is based on the farm weights of the cattle. When the New Orleans live weights are taken, as in the last column, it raises the figures in the last column from 2 to 2.5 points in each case.

TABLE 17.—*Total summary of summer feeding.*

	1908 (112 days).				1909 (154 days).		
	Lot A, pasture alone.	Lot B, pasture plus cotton-seed cake.	Lot C, pasture plus cold-pressed cotton-seed cake.	Lot D, pasture plus cot ton-seed cake.	Lot A, pasture alone.	Lot B, pasture plus cotton-seed cake.	Lot E, pasture plus cotton seed.
Average weight at beginning of test........pounds..	732	739	738	532	647	639	653
Average weight at end of test, pounds........	902	999	944	713	915	929	970
Average daily gain....pounds..	1.52	2.32	1.84	1.62	1.74	1.88	2.06
Average amount concentrates consumed per day...pounds..	....	3.31	3.31	2.76	....	3.40	4.49
Average amount concentrates to make 100 pounds gain, pounds........	....	143	180	171	....	181	218
Cost 100 pounds gain, pasture charged........	$1.18	$2.56	$3.04	$3.24	$1.03	$3.21	$2.39
Initial cost of steers per 100 pounds........	$2.92	$2.92	$2.92	$2.50	$2.95	$2.95	$2.95
Selling price per 100 pounds at New Orleans........	$3.66	$4.53	$4.35	$3.44	$3.79	$4.37	$4.25
Total profit per steer........	$2.86	$10.42	$6.62	$0.43	$7.06	$6.99	$8.39

SUMMARY OF SUMMER WORK.

1. The steers which were used in the winter work were redivided into lots and continued into the summer feeding work.

2. In 1908 the steers were fed a period of 112 days on pasture. In 1909 they were fed for 154 days.

3. The summer rations were:

	1908.	1909.
Lot A........	Pasture alone........	Pasture alone.
Lot B........	Pasture plus cotton-seed cake........	Pasture plus cotton-seed cake.
Lot C........	Pasture plus cold-pressed cotton-seed cake.	
Lot D........	Pasture plus cotton-seed cake........	
Lot E........	....	Pasture plus cotton seed.

4. In 1908 the amount of feed used daily per steer, in addition to the pasture, was 3.31 pounds, 3.31 pounds, and 2.76 pounds in lots B, C, and D, respectively. In 1909 the daily amount of feed used per steer to supplement the pasture was 3.4 pounds and 4.49 pounds in lots B and E, respectively.

5. In 1908 the average daily gains were 1.52, 2.32, 1.84, and 1.62 pounds in lots A, B, C, and D, respectively. In 1909 the average daily gains were 1.74, 1.88, and 2.06 pounds in lots A, B, and E, respectively.

6. In 1908 the total cost to make 100 pounds of gain was $1.18, $2.56, $3.04, and $3.24 in lots A, B, C, and D, respectively. In 1909 the total cost to make 100 pounds of gain was $1.03, $3.21, and $2.39 in lots A, B, and E, respectively.

7. In 1908 the net profits per steer were $2,86, $10.42, $6.62, and $0.43 in lots A, B, C, and D, respectively. In 1909 the net profits per steer were $7.06, $6.99, and $8.39 in lots A, B, and E, respectively.

8. In 1908 the steers dressed out (farm weights) 49.5 per cent, 53.8 per cent, 53.6 per cent, and 52.7 per cent in lots A, B, C, and D, respectively. In 1909 they dressed out (farm weights) 51.8 per cent, 54.2 per cent, and 53.9 per cent in lots A, B, and E, respectively.

9. These experiments are being continued.

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